



AMENDMENTS TO THE CLAIMS

1. (Currently amended) A method of extraction of phytosterols, squalene and vitamin E from crude palm oil comprising the steps of:

- a) conversion of crude palm oil into palm oil methyl esters;
- b) three short path distillation of crude palm oil methyl esters obtained in ~~1-(a)~~ step a) to yield phytonutrients concentrate;
- c) saponification of phytonutrients concentrate from ~~1(b)~~ step b);
- d) crystallization of phytosterols;
- e) ~~solvents~~ solvent partitioning of vitamin E and squalene.

2-7. (Cancelled)

8. (Currently amended) A method as claimed in claim ~~5~~, 20, wherein the unsaponifiable matters is mixed with hydrocarbon solvent, short chain alcohol and water of ratio 25:1:1 and heated to temperature of 65°C to 85°C and slowly cooled to temperature of 10°C to 30°C to crystallize phytosterols.

9. (Currently amended) A method as claimed in claim ~~8~~ 21, wherein the ~~filtrate is mixed with ratio of~~ hydrocarbon solvent ~~and to~~ short chain alcohol ~~of ratio 5:3~~ used to partition the non-polar squalene into hydrocarbon layer and polar vitamin E into alcohol layer is 5:3.

10. (Cancelled)

11. (Previously presented) Vitamin E, squalene or phytosterols as extracted as in claim 1.

12. (Currently amended) A method of extraction of phytosterols, squalene and vitamin E from crude palm oil comprising the steps of:

- i. conversion of crude palm oil into palm oil methyl esters;

- ii. first stage short path distillation carried out on the crude palm oil methyl esters obtained in step (i) above at a temperature of 70°C to 120°C and pressure between 10 mTorr to 50 mTorr;
- iii. second stage short path distillation carried out on the residue obtained in step (ii) above at a temperature of 130°C to 200°C and pressure less than 1 mTorr;
- iv. third stage short path distillation carried out on the distillate obtained in step (iii) above at a temperature below 120°C and pressure less than 1 mTorr;
- v. saponification of the residue obtained in step (iv) above ~~carried out using potassium hydroxide or sodium hydroxide at 10% concentration and refluxed in alcohol for 30 minutes to one hour under nitrogen blanketing;~~
- vi. solvent extraction of unsaponifiable matter from the saponified product obtained in step (v) above;
- vii. mixing the unsaponifiable matters in step (v) (vi) above with hydrocarbon solvent, short chain alcohol and water of ratio 25:1:1 and heating mixture to temperature of 65°C to 85°C and cooling slowly to temperature of 25°C to 30°C to crystallize phytosterols;
- viii. crystallization of phytosterols from the mixture obtained in step (vii) above;
- ix. separating the crystallized phytosterols and the mixture left is dried;
- x. ~~vii. mixing filtrate~~ the dried mixture obtained in step ~~(vi) (ix)~~ above with a hydrocarbon which is at least one selected from the group consisting of heptane, hexane and iso-octane solvent and a short chain alcohol which is at least one selected from the group consisting of methanol, ethanol, butanol and isopropanol in ratio 5:3 to partition non-polar squalene into hydrocarbon layer and polar vitamin E into alcohol layer;
- ~~viii. separating two layers and subsequently adding hydrocarbon selected in step (viii) (vii) into short chain alcohol layer selected in step (viii) and short chain alcohol selected in step (viii) (vii) into hydrocarbon layer to further partition the vitamin E and squalene;~~
- ~~ix. extracting squalene from the hydrocarbon layer and extracting vitamin E from the alcohol layer.~~

13. (Cancelled)

14. (New) A method as claimed in claim 1, wherein hydrocarbon solvent and short chain alcohol is used in step e) to partition squalene into hydrocarbon layer and vitamin E into alcohol layer.

15. (New) A method as claimed in claim 1, wherein hexane and methanol is used in step e) to partition squalene into hexane layer and vitamin E into methanol layer.

16. (New) A method as claimed in claim 1, wherein step b) proceeds as follows:

- i) first stage short path distillation is carried out on crude palm oil methyl esters;
- ii) second stage short path distillation is carried out on the residue of the first stage short path distillation;
- iii) third stage short path distillation is carried out on the distillate of the second stage short path distillation to yield phytonutrients concentrate as residue.

17. (New) A method as claimed in claim 16, wherein the second stage short path distillation is carried out at temperature of 130°C to 200°C and pressure less than 1 mTorr.

18. (New) A method as claimed in claim 16, wherein the first stage short path distillation is carried out at a temperature of 70°C to 120°C and pressure between 10 mTorr to 50 mTorr; the second stage short path distillation is carried out at temperature of 130°C to 200°C and pressure less than 1 mTorr; the third stage short path distillation is carried out at a temperature below 120°C and pressure less than 1 mTorr.

19. (New) A method as claimed in claim 1, wherein unsaponifiable matter is solvent extracted from saponified product obtained in step c) and phytosterols is crystallized from the unsaponifiable matter.

20. (New) A method as claimed in claim 19, wherein the unsaponifiable matter is mixed with hydrocarbon solvent, short chain alcohol and water and phytosterols is crystallized from the mixture.

21. (New) A method as claimed in claim 20, wherein the mixture left after separation of the crystallized phytosterols is dried and then mixed with hydrocarbon solvent and short chain alcohol to partition squalene into hydrocarbon layer and vitamin E into alcohol layer.

22. (New) A method as claimed in claim 21, wherein hexane and methanol is used to partition squalene and vitamin E.